PREDEFINED RISK ASSESSMENT PDRA-G02 Version 1.1, EDITION January 2022

(a) Scope

This PDRA is the result of applying the methodology that is described in AMC1 to Article 11 of the UAS Regulation to UAS operations conducted in the ‘specific’ category with the following main attributes:

1. UA with maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of a multirotor) of up to 3 m and typical kinetic energies of up to 34 kJ;
2. BVLOS of the remote pilot;
3. over sparsely populated areas;
4. in airspace that is reserved or segregated for the UAS operation, corresponding to an air risk that can be classified as ARC-a;
5. within the range of the direct C2 link[[1]](#footnote-1) (radio line of sight) up to the height of the upper boundary of the reserved airspace.

(b) PDRA characterisation and conditions

The characterisation and conditions for this PDRA are summarised in Table PDRA-G02.1 below.

| PDRA characterisation and conditions | | | | | | | | |  |
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| Topic | Method of proof | | Condition | | | Integrity[[2]](#footnote-2) | | Proof2 | to be completed by BG CAA |
| **1. Operational characterisation (scope and limitations)** | | | | | | | | |  |
| Level of human intervention | Self-declaration | | 1.1 No autonomous operations: the remote pilot should have the ability to maintain control of the UA, except in case of a loss of the command-and-control (C2) link. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 1.2 The remote pilot should operate only one UA at a time. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 1.3 The remote pilot should not operate the UA from a moving vehicle. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 1.4 The remote pilot should not hand the control of the UA over to another command unit. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| UA range limit | Self-declaration | | 1.5 Launch/recovery: At VLOS distance from the remote pilot, if not operating from a safe prepared area.  *Note: ‘safe prepared area’ means a controlled ground area that is suitable for the safe launch/recovery of the UA.* | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 1.6 In flight: The range limit should be within the coverage of the direct C2 link (radio line of sight), which ensures the safe conduct of the flight. | | | *Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.* | | ‘I declare compliance.’ or ‘n/a’ |  |
| Overflown areas | Declaration supported by data | | 1.7 UAS operations should be conducted over sparsely populated areas. | | | *Please include a reference to the relevant chapter/section of the OM where the procedures for determining the population density are provided.* | | ‘I declare compliance.’  *Please describe how the population density data is identified.* |  |
| UA limitations | Self-declaration | | 1.8 Maximum characteristic dimension (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of a multirotor): 3 m | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 1.9 Typical kinetic energy (as defined in paragraph 2.3.1(k) of AMC1 to Article 11 of the UAS Regulation: up to 34 kJ | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| Flight height limit | Self-declaration | | 1.10 The maximum height of the operation volume is limited by the size of the reserved or segregated airspace.  *Note: In addition to the vertical limit of the operational volume, an air risk buffer is to be considered (see ‘Air risk’ under point 3 of this table).* | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| Airspace | Self-declaration | | 1.11 Operations should only be conducted in airspace that is reserved or segregated for the purpose of conducting UAS operations (corresponding to an air risk that can be classified as ARC-a). | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| Visibility | Self-declaration | | 1.12 If take-off and landing are conducted in VLOS of the remote pilot, the visibility should be sufficient to ensure that no people are in danger during the take‑off/landing phase. The remote pilot should abort the take‑off or landing in case people on the ground are in danger. | | | *Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.* | | ‘I declare compliance.’ or ‘n/a’ |  |
| Others | Self-declaration | | 1.13 The UA should not be used to drop material or to carry dangerous goods, except for dropping items in connection with agricultural, horticultural or forestry activities where the carriage of such items does not contravene any other applicable regulations. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 2. Operational risk classification (according to the classification defined in AMC1 to Article 11 of the UAS Regulation) | | | | | | | | |  |
| Final GRC | 3 | **Final ARC** | | ARC-b | **SAIL** | | II | |  |
| 3. Operational mitigations | | | | | | | | |  |
| Operational volume (see Figure 2 of AMC1 Article 11) | Self-declaration | | 3.1 To determine the operational volume, the applicant should consider the position-keeping capabilities of the UAS in 4D space (latitude, longitude, height, and time). | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 3.2 In particular, the accuracy of the navigation solution, the flight technical error of the UAS, as well as the flight path definition error (e.g. map error) and latencies should be considered and addressed when determining the operational volume. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 3.3 The remote pilot should apply emergency procedures as soon as there is an indication that the UA may exceed the limits of the operational volume. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| Ground risk | Self-declaration | | 3.4 The UAS operator should establish a ground risk buffer to protect third parties on the ground outside the operational volume. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 3.4.1 The minimum criterion should be the use of the ‘1:1 rule’ (e.g. if the UA is planned to operate at a height of 150 m, the ground risk buffer should at least be 150 m). | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 3.5 The operational volume and the ground risk buffer should be all contained in a sparsely populated area. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 3.6 The applicant should evaluate the area of operations typically by means of an on-site inspection or appraisal, and should be able to justify a reduced density of people at risk in the operational area and the ground risk buffer. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| Air risk | Self-declaration | | 3.7 The operational volume, including the air risk buffer, if applicable, should be entirely contained in the reserved or segregated airspace. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| Observers |  | | n/a | | |  | |  |  |
| **4. UAS operator and UAS operations conditions** | | | | | | | | |  |
| UAS operator and UAS operations | Declaration supported by data | | 4.1 The UAS operator should: | | | *Please describe how this condition is met.* | | ‘I declare compliance and that supporting evidence is included in the OM.’ |  |
| 4.1.1 develop an operations manual (OM) (for the template, refer to AMC1 UAS.SPEC.030(3)(e) and to the complementary information in GM1 UAS.SPEC.030(3)(e)); | | | *Please describe how this condition is met.* | | ‘I declare compliance and that supporting evidence is included in the OM.’ |  |
| 4.1.2 develop procedures to ensure that the security requirements applicable to the area of operations are complied during the intended operation; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance and that supporting evidence is included in the OM.’ |  |
| 4.1.3 develop measures to protect the UAS against unlawful interference and unauthorised access; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance and that supporting evidence is included in the OM.’ |  |
| 4.1.4 develop procedures to ensure that all operations comply with Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data; in particular, the UAS operator should carry out a data protection impact assessment, when this is required by the data protection national authority of the Member State with regard to the application of Article 35 of that Regulation; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance and that supporting evidence is included in the OM.’ |  |
| 4.1.5 develop guidelines for its remote pilots to plan UAS operations in a manner that minimises nuisance, including noise and other emissions-related nuisance, to people and animals; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance and that supporting evidence is included in the OM.’ |  |
| 4.1.6 develop an emergency response plan (ERP) in accordance with the conditions for a ‘medium’ level of robustness (please refer to AMC3 UAS.SPEC.030(3)(e); | | | *Please describe how this condition is met.* | | ‘I declare compliance and that the ERP is available to the competent authority for review.’ |  |
| 4.1.7 validate the operational procedures in accordance with the conditions for a ‘medium’ level of robustness, which are included in AMC2 UAS.SPEC.030(3)(e); | | | *Please describe how this condition is met.* | | ‘I declare compliance and that the ERP is available to the competent authority for review.’ |  |
| 4.1.8 ensure the adequacy of the contingency and emergency procedures and prove it through any of the following:  (a) dedicated flight tests; or  (b) simulations, provided that the representativeness of the simulation means is proven for the intended purpose with positive results; or  (c) any other means acceptable to the competent authority; and | | | *Please describe how this condition is met.* | | ‘I declare compliance and that the description for meeting this condition is available to the competent authority for review.’ |  |
| 4.1.9 have a policy that defines how the remote pilot and any other personnel in charge of duties essential to the UAS operation can declare themselves fit to operate before conducting any operation. | | | *Please describe how this condition is met.* | | ‘I declare compliance and that the description for meeting this condition is available to the competent authority for review.’ |  |
| 4.1.10 designate for each flight a remote pilot with adequate competency and other personnel in charge of duties essential to the UAS operation if needed; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance and that supporting evidence is included in the OM.’ |  |
| 4.1.11 ensure that the UAS operation effectively uses and supports the efficient use of the radio spectrum in order to avoid harmful interference; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance and that supporting evidence is included in the OM.’ |  |
| 4.1.12 keep for a minimum of 3 years and maintain up to date a record of the information on UAS operations, including any unusual technical or operational occurrences and other data as required by the declaration or by the operational authorisation; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance and that record-keeping data is available to the competent authority.’ |  |
| 4.1.13 As part of the procedures contained in the OM (point 4.1.1 above), include the description of the following: | | |  | |  |  |
| (a) The method and means of communication with the authority or entity responsible for the management of the airspace during the entire period of the reserved or segregated airspace being active, as mandated by the authorisation.  *Note: The communication method should be published in the NOTAM activating the reserved airspace to also allow coordination with manned aircraft.* | | | *Please describe how this condition is met.* | | ‘I declare compliance and that evidence is available to the competent authority for review.’ |  |
| (b) The member(s) of personnel in charge of duties essential to the UAS operation, who are responsible for establishing that communication. | | | *Please describe how this condition is met.* | | ‘I declare compliance and that evidence is available to the competent authority for review.’ |  |
| UAS maintenance | Self-declaration | | * 1. The UAS operator should: | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 4.2.1 ensure that the UAS maintenance instructions that are defined by the UAS operator are included in the OM and cover at least the UAS manufacturer’s instructions and requirements when applicable~~.~~; and | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 4.2.2 ensure that the maintenance staff follow the UAS maintenance instructions when performing maintenance;~~.~~ | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 4.2.3 keep for a minimum of 3 years and maintain up to date a record of the maintenance activities conducted on the UAS; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 4.2.4 establish and keep up to date a list of the maintenance staff employed by the operator to carry out maintenance activities; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 4.2.5 comply with point UAS.SPEC.100, if the UAS uses certified equipment. | | | *Please include a reference to the relevant chapter/section of the OM or indicate ‘n/a’.* | | ‘I declare compliance.’ or ‘n/a’ |  |
| External services | Self-declaration | | 4.3 The UAS operator should ensure that the level of performance for any externally provided service that is necessary for the safety of the flight is adequate for the intended operation. The UAS operator should declare that this level of performance is adequately achieved. | | | *Please describe how this condition is met.* | | ‘I declare compliance.’ |  |
| 4.4 The UAS operator should define and allocate the roles and responsibilities between the UAS operator and the external service provider(s), if applicable. | | | *Please describe how this condition is met.* | | ‘I declare compliance.’ |  |
| **5. Conditions for the personnel in charge of duties essential to the UAS operation** | | | | | | | | |  |
|  |  | | 5.4 The remote pilot should: | | |  | |  |  |
| 5.4.1 not perform duties under the influence of psychoactive substances or alcohol, or when they are unfit to perform their tasks due to injury, fatigue, medication, sickness or other causes; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 5.4.2 be familiar with the manufacturer’s instructions provided by the manufacturer of the UAS; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 5.4.3 ensure that the UA remains clear of clouds; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 5.4.4 perform unaided visual scan of the airspace, as required, to avoid any potential collision hazard; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 5.4.5 obtain updated information relevant to the intended operation about any geographical zones defined in accordance with Article 15; and | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 5.4.6 ensure that the UAS is in a safe condition to complete the intended flight safely and, if applicable, check whether the direct remote identification is active and up to date. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| Multi-crew cooperation (MCC) | Self-declaration | | Where multi-crew cooperation (MCC) may be required, the UAS operator should: | | |  | |  |  |
| 5.5 designate a remote pilot-in-command to be responsible for each flight; | | | *Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.* | | ‘I declare compliance.’ or ‘n/a’ |  |
| 5.6 include procedures to ensure coordination between the remote crew members through robust and effective communication channels; those procedures should cover, as a minimum: | | | *Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.* | | ‘I declare compliance.’ or ‘n/a’ |  |
| 5.6.1 the assignment of tasks to the remote crew members; and | | | *Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.* | | ‘I declare compliance.’ or ‘n/a’ |  |
| 5.6.2 the establishment of step-by-step communication; and | | | *Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.* | | ‘I declare compliance.’ or ‘n/a’ |  |
| 5.7 ensure that the training of the remote crew covers MCC. | | | *Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.* | | ‘I declare compliance.’ or ‘n/a’ |  |
| Maintenance staff | Declaration supported by data | | 5.8 Any staff member that is authorised by the UAS operator to perform maintenance activities should have been adequately trained in the documented maintenance procedures. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance and that supporting evidence is included in the OM.’  Evidence of training is available at the request of the competent authority. |  |
| Personnel in charge of duties essential to the UAS operation are fit to operate |  | | 5.9 The personnel in charge of duties essential to the UAS operation should declare that they are fit to operate before conducting any operation, based on the policy that is defined by the UAS operator. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| **6. Technical conditions** | | | | | | | | |  |
| General | Self-declaration | | 6.1 The UAS should be equipped with means to monitor the critical parameters of a safe flight, in particular the following: | | |  | |  |  |
| 6.1.1 the UA position, height or altitude, ground speed or airspeed, attitude and trajectory; | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 6.1.2 the UAS energy status (fuel, battery charge, etc.); and | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 6.1.3 the status of critical functions and systems; as a minimum, for services based on RF signals (e.g. C2 link, GNSS, etc.), means should be provided to monitor the adequate performance and trigger an alert when the performance level becomes too low. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| Human–~~-~~machine interface (HMI) | Self-declaration | | 6.2 The UAS information and control interfaces should be clearly and succinctly presented and should not confuse, cause unreasonable fatigue, or contribute to causing any disturbance to the personnel in charge of duties essential to the UAS operation in such a way that could adversely affect the safety of the operation. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 6.3 The UAS operator should conduct a UAS evaluation that considers and addresses human factors to determine whether the HMI is appropriate for the operation. | | | *Please describe how this condition is met.* | | ‘I declare compliance.’ |  |
| C2 links and communication | Self-declaration | | 6.4 The UAS should comply with the applicable requirements for radio equipment and the use of the RF spectrum. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 6.5 Protection mechanisms against interference should be used, especially if unlicensed bands (e.g. ISM) are used for the C2 link (mechanisms such as FHSS, DSSS or OFDM technologies, or frequency deconfliction by procedure). | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 6.6 The UAS should be equipped with a C2 link that is protected against unauthorised access to the command-and-control functions. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 6.7 In case of loss of the C2 link, the UAS should have a reliable and predictable method to recover the command-and-control link of the UA or to terminate the flight in a way that reduces any undesirable effect on third parties in the air or on the ground. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| 6.8 The UAS operator should ensure that reliable and continuous means of two-way communication for the purpose that is indicated in point 4.13(a) above are available. | | | *Please include a reference to the relevant chapter/section of the OM.* | | ‘I declare compliance.’ |  |
| Tactical mitigation |  | | n/a | | |  | |  |  |
| Containment | Declaration supported by data | | 6.9 To ensure a safe recovery from a technical issue that involves the UAS or an external system that supports the operation, the UAS operator should ensure that: | | |  | |  |  |
| 6.9.1 no probable failure of the UAS or of any external system that supports the operation would lead to operation outside the operational volume; and | | | *Please describe how this condition is met.* | | ‘I declare compliance.’  A design and installation appraisal is available and it covers at least:   * the design and installation features (independence, separation, and redundancy); and * the particular risks (e.g. hail, ice, snow, electromagnetic interference, etc.) relevant to the type of operation. |  |
| 6.9.2 it is reasonably expected that a fatality will not occur due to any probable failure of the UAS or of any external system that supports the operation.  *Note: The term ‘probable’ should be understood in its qualitative interpretation, i.e. ‘anticipated to occur one or more times during the entire system/operational life of an item’.* | | | *Please describe how this condition is met.* | |  |
| Declaration supported by data | | 6.10 The following additional conditions should apply if the adjacent area includes an assembly of people or if the adjacent airspace is classified as ARC-d (in accordance with the SORA): | | |  | |  |  |
| 6.10.1 The UAS should be designed to standards that are considered adequate by the competent authority and/or in accordance with a means of compliance that is acceptable to that competent authority such that: | | | *Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.* | | ‘I declare compliance.’  Analysis and/or test data with supporting evidence is available. |  |
| 6.10.1.1 the probability of the UA leaving the operational volume should be less than 10–4/FH; and | | | *Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.* | |  |
| 6. 10.1.2 no single failure of the UAS or of any external system that supports the operation should lead to operation outside the ground risk buffer.  *Note: The term ‘failure’ should be understood as an occurrence that affects the operation of a component, part, or element in such a way that it can no longer function as intended. Errors may cause failures but are not considered to be failures. Some structural or mechanical failures may be excluded from this criterion if it can be shown that these mechanical parts were designed according to aviation industry best practices.* | | | *Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.* | |  |
| 6.10.2 SW and AEH whose development error(s) could directly lead to operations outside the ground risk buffer should be developed according to an industry standard or methodology that is recognised as adequate by the competent authority.  *Note 1: The proposed additional safety conditions cover both the integrity and the assurance levels.*  *Note 2: The proposed additional safety conditions do not imply a systematic need to develop the SW and AEH according to an industry standard or methodology that Is recognised as adequate by the competent authority. For instance, if the UA design includes an independent engine shutdown function that systematically prevents the UA from exiting the ground risk buffer due to single failures or an SW/AEH error of the flight controls from occurring, the intent of the conditions of point 6.10.1 above could be considered met.* | | | *Please include a reference to the relevant chapter/section of the OM or indicate ‘n/a’.* | |  |
| Remote identification | Self-declaration | | 6.11 The UAS has a unique serial number compliant with standard ANSI/CTA-2063-A-2019, *Small Unmanned Aerial Systems Serial Numbers*, 2019, according to Article 40(4) of Regulation (EU) 2019/945. | | | *Please describe how this condition is met.* | | ‘I declare compliance.’ |  |
| 6.12 The UAS is equipped with a remote identification system according to Article 40(5) of Regulation (EU) 2019/945. | | | *Please describe how this condition is met.* | | ‘I declare compliance.’ |  |
| Lights | Self-declaration | | 6.13 If the UAS is operated at night, it is equipped with at least one green flashing light according to point UAS.SPEC.050(1)(l)(i) of the UAS Regulation. | | | *Please describe how this condition is met or indicate ‘n/a’.* | | ‘I declare compliance.’ or ‘n/a’ |  |

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| Обобщение на констатациите: *Попълва се от ГД ГВА* |
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| За и от името на Оператора на БЛС |  |  | Проверено от ГД ГВА |
| Име (отговорен ръководител): |  |  | Име (инспектор): |
| Подпис: |  |  | Подпис: |
| Дата: |  |  | Дата: |

1. Due to the lack of experience in the use of communication services for extending the C2 link coverage through communication networks (e.g. mobile networks) in the type of UAS operations that are addressed by this PDRA, the scope of the PDRA is initially limited to the coverage of a direct C2 Link (direct link between the control station and the UA). As more experience in the use of those communication services is gained, the conditions of this PDRA may be revised to encompass their uses. [↑](#footnote-ref-1)
2. To be filled in by the UAS operator. [↑](#footnote-ref-2)